REMARKS

Favorable reconsideration of this application in view of the above amendments and the following remarks is respectfully requested. By this amendment, claims 1, 24, 44 and 47 are amended to more clearly recite the subject matter of the instant application. Applicant submits that no new matter has been added and formal notice of such is solicited.

The undersigned thanks the Examiner for his courtesies extended during the in-person interview held on May 3, 2006. The interview was attended by the inventor, Mr. Robert Winsor, the undersigned, Mr. Patrick Finnan and the Examiner's supervisor.

The Office Action rejects claims 1, 3-10, 12-17, 19-31, 33-38, 40 and 47 under 35 USC 103(a) as unpatentable over by Doucet et al., U.S. Patent 5,786,923 (hereinafter, Doucet) in view of Liou, U.S. Patent No. 5,623,363 (hereinafter, Liou) and further in view of Buser et al., U.S. Patent No. 4,361,911 (hereinafter, Buser).

The Office Action rejects claims 11 and 32 under 35 USC 103(a) over the combination of Doucet, Liou, Buser and Meadows, U.S. Patent No. 5,381,250 (hereinafter, Meadows).

The Office Action rejects claims 18 and 39 under 35 USC 103(a) as obvious in view of Doucet, Liou, Buser in further view of Yonenaga, U.S. Patent No. 5,543,952 (hereinafter, Yonenaga).

Finally, the Office Action rejects claims 44-46 under 35 USC 103(a) as obvious in view of Doucet, Liou, Buser in further view of Huggins, U.S. Patent No. 4,799,797 (hereinafter, Huggins).

These rejections are respectfully traversed.

Doucet relates to a point-to-multipoint bi-directional wide area telecommunications network using atmospheric optical communication that includes a primary transceiver unit, a plurality of subscriber transceiver units and an optical router. Doucet does not describe the atmospheric issues, such as speckle and scintillation, in a free-space optical communication system. As a result, Doucet does not describe any techniques to mitigate these atmospheric effects. Doucet describes a laundry list of light sources and in this list includes the phrase "or

other coherent and/or non-coherent light". Doucet, column 4, lines 53-57. Doucet does not expand on the advantages of any particular type of light source.

Liou relates to a semiconductor light source, such as a light emitting diode (LED) that is capable of producing either single or multi-mode light. Liou makes no teaching or suggestion of using the light source in connection with free space optical communications. Liou suffers from other insufficiencies.

Liou does not teach or suggest that an LED can be effectively externally modulated at very high data rates, such as multi-gigabit rates. Moreover, Liou does not teach or suggest that an LED can be effectively amplified for use in a free-space optical communication system and still retain its incoherence (Claims 6 and 28 of the present application). Liou also fails to describe that a SLED can be filtered to fit within a particular spectral channel or bandwidth, such as an ITU compliant channel (Claims 9 and 31 of the present application). Finally, Liou makes no teaching or suggestion that an LED has qualities beneficial for a free-space optical communication system, and consequently does not acknowledge or discuss the atmospheric issues of turbulence, speckle, scintillation, etc.

Before proceeding to Buser, the following comments are provided with respect to a combination of the teachings of Doucet and Liou, assuming, for the sake of argument, that Doucet and Liou, are combinable. One with ordinary skill in the art, without having first read the present patent application, that reads Doucet (which makes a mere passing mention of non-coherent light as a possible light source with no mention or acknowledgement in Doucet of atmospheric scintillation issues and the need to mitigate them) and Liou (for its teaching of an LED as a source of incoherent light) would not find it obvious to reduce atmospheric scintillation in a free-space optical communication system by the use of a phase incoherent light beam produced from a single incoherent light source. Doucet does not even acknowledge the issues of atmospheric scintillation nor does it describe or recognize the benefits of selecting an incoherent light source, from among the types of light sources it lists, to reduce scintillation. It is respectfully submitted that, without the improper use of hindsight, Doucet combined with Liou

would not render obvious the claimed technique of reducing atmospheric scintillation in free-space optical communication with a single incoherent light source.

Buser describes a laser retroreflector system, and in one embodiment, the simultaneous use of multiple coherent light sources. In particular, at column 6, lines 36-47, Buser describes that "multiple wavelength operation" can "reduce the effects of atmospheric scintillation" where that "[m]ultiple wavelengths λ_1, λ_2,... λ_m could be simultaneously transmitted such that incoherent addition of the different wavefronts for each λ would reduce the fluctuation of intensity across the receiver plane." Buser goes on to describe a method for generating multiple wavelengths using a "laser gain medium", that is, with a laser structure that produces coherent light at multiple wavelengths. Buser, column 6, lines 48-62. That is, Buser teaches the simultaneous use of multiple coherent light sources each at a different wavelength.

The simultaneous operation of a plurality of coherent light sources does not produce incoherent light. It is still coherent light. Due to the coherence of each individual light source, multiple colors that are near each other (e.g., a few nanometers) would experience essentially the same speckle pattern and therefore little or no scintillation mitigation would result. A phase-incoherent light source, such as a SLED, can be band-limited to a narrow wavelength range and still achieve significant reduction in speckle, whereas a combination of coherent light sources could not be so band-limited and achieve such mitigation. If a combination of coherent light sources is used in an attempt to produce incoherent light, numerous sources would be needed and they would need to be spectrally far apart, covering a rather broad spectral range. Consequently, the combination of coherent sources would use a significant amount of spectral range, more than even an unfiltered SLED. Thus, such a technique could not be used for wavelength division multiplexing (WDM), whereas a single SLED can be used for WDM. Further still, to use multiple coherent light sources requires additional equipment for each light source, including filters to multiplex the colors into one beam.

As an additional matter, Buser does not teach the use of an entirely phase-incoherent light source to mitigate the atmospheric problems. By describing the use of multiple coherent sources,

Buser does not teach or suggest the best way of mitigating these effects (by using truly incoherent light). One with ordinary skill in the art, e.g., Buser, would not describe separate multiple wavelength sources unless he/she is referring to multiple coherent sources.

The present invention, as now clarified in independent claims 1, 24, 44 and 47, takes recognition of the benefits of single mode phase incoherent light for optical communication in free space over relatively long distances. In particular, according to the present invention, a method for reducing atmospheric turbulence (which leads to scintillation) effects in free space optical communications is provided involving the use of phase incoherent single mode light produced by a single source of incoherent light.

It is respectfully submitted that the Office Action fails to make a prima facie case of obviousness with respect to the subject matter of the claims based on the combination of Doucet and Liou, or based on the combination of Doucet, Liou and Buser.

In support of the non-obviousness of the claimed subject matter of the present application with respect to the alleged combination of Doucet and Liou or the combination of Doucet, Liou and Buser, submitted herewith is a signed declaration under 37 CFR 1.132 of William Rabinovich. Dr. Rabinovich is an expert in the field of optical communications, including free-space optical communications. This declaration is submitted as evidence to rebut the obviousness rejection, and in support of Applicant's position that one with ordinary skill in the art would not have been motivated to use an incoherent light source (such as an LED) in a free space optical communication system in order to reduce atmospheric scintillation. This declaration is submitted also as objective evidence of unexpected results and skepticism of others in the art, to rebut the obviousness rejection of the claims.

The secondary references to Huggins, Yonenaga and Meadows add nothing further to the teachings of Doucet, Liou and Buser that relates to the subject matter described above.

Applicant submits that all pending claims are in condition for allowance, and formal notice of such is solicited. If the Examiner has any questions, the Examiner is respectfully requested to contact the undersigned at the number listed below.

Attached herewith is a Petition for two months' extension of time for responding to the Office Action dated March 16, 2006, together with a check in the amount of $450.00 for the applicable fee. However, Applicant hereby petitions for any further extension of time that may be necessary to maintain the pendency of this application. The Commissioner is hereby authorized to charge payment of any additional fees required for the above-identified application or credit any overpayment to Deposit Account No. 05-0460.

Respectfully submitted,

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Hand Delivered on: July 31, 2006